U.S. Department of the Interior

Onshore elevation data from National Oceanic and Atmospheric Administration (NOAA)

Office for Coastal Management's Digital Coast (available at http://www.csc.noaa.gov/

digitalcoast/data/coastallidar/) and from U.S. Geological Survey's National Elevation

Dataset (available at http://ned.usgs.gov/). Offshore shaded-relief bathymetry from map

on sheet 2, this report. California's State Waters limit from NOAA Office of Coast Survey

Universal Transverse Mercator projection, Zone 10N

NOT INTENDED FOR NAVIGATIONAL USE

Open-File Report 2018–1023

Pamphlet accompanies map

U.S. Geological Survey



DESCRIPTION OF MAP UNITS

DEPTH ZONE 2—INTERTIDAL TO 30 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock

Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose Rugged anthropogenic material—High backscatter, high rugosity; related to development by

SLOPE CLASS 2—5 TO 30 DEGREES

Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock

DEPTH ZONE 3—30 METERS TO 100 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose Medium- to coarse-grained sediment—Very high backscatter, low rugosity; typically mediumto coarse-grained sediment, with varying amounts of shell hash; in scour depressions

SLOPE CLASS 2—5 TO 30 DEGREES Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose

DEPTH ZONE 4—100 METERS TO 200 METERS WATER DEPTH

Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose

SLOPE CLASS 2—5 TO 30 DEGREES

SLOPE CLASS 3—30 TO 60 DEGREES Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock

Area of "no data"—Areas near shoreline not mapped owing to insufficient high-resolution seafloor mapping data; areas beyond 3-nautical-mile limit of California's State Waters were not mapped as part of California Seafloor Mapping Program 3-nautical-mile limit of California's State Waters

—20 — Bathymetric contour (in meters)—Derived from modified 2-m-resolution bathymetry grid. Contour interval: 10 m

EXPLANATION OF MAP SYMBOLS

DISCUSSION This seafloor-character map of the Offshore of Gaviota map area in southern California was produced using video-supervised, maximum-likelihood classification of the bathymetry and backscatter (intensity of return) signals from sonar systems (see Golden and Cochrane, 2013, for a summary of the video data collected for the purpose of supervising the classification). Rugosity (a GIS-derived characterization of roughness) and backscatter intensity were used as variants in the classification. The interpreted classifica-

tions were then draped over shaded-relief bathymetry (see sheet 2).

The substrate classes mapped in this area have been divided into the following California Marine Life Protection Act depth zones: Depth Zone 2 (intertidal to 30 m), Depth Zone 3 (30 to 100 m), and Depth Zone 4 (100 to 200 m). In addition, the following slope classes are represented on this map (Coastal and Marine Ecological Classification Standard slope zones are shown in parentheses): Slope Class 1, 0° to 5° (flat); Slope Class 2, 5° to 30° (sloping); and Slope Class 3, 30° to 60° (steeply sloping). Depth Zone 1 (intertidal), Depth Zone 5 (greater than 200 m), and Slope Classes 4 and 5, greater than 60° (vertical to overhang), are not present in this map area. Fine- to medium-grained smooth sediment (sand and mud) makes up 78.8 percent (75.1 km²) of the map

area: 21.6 percent (20.6 km²) is in Depth Zone 2, 46.7 percent (44.5 km²) is in Depth Zone 3, and 10.5 percent (10.0 km²) is in Depth Zone 4. Mixed smooth sediment (sand and gravel) and rock (that is, sediment typically forming a veneer over bedrock, or rock outcrops having little to no relief) make up 16.2 percent (15.4 km²) of the map area: 6.1 percent (5.9 km²) is in Depth Zone 2, 8.0 percent (7.7 km²) is in Depth Zone 3, and 2.0 percent (1.9 km²) is in Depth Zone 4. Rock and boulder, rugose (rocky outcrops, boulder fields, and asphalt mounds having high surficial complexity) makes up 4.9 percent (4.7 km²) of the map area: 2.0 percent (1.9 km²) is in Depth Zone 2, 1.7 percent (1.7 km²) is in Depth Zone 3, and 1.3 percent (1.2 km²) is in Depth Zone 4. Medium- to coarse-grained sediment (in scour depressions consisting of material that is coarser than the surrounding seafloor), which makes up less than 0.1 percent (<0.1 km²) of the map area, is only present in Depth Zone 3. Rugged anthropogenic material makes up less than 0.1 percent (<0.1 km²) of the map area and is only present in Depth Zone 2 (table 1).

REFERENCE CITED

Golden, N.E., and Cochrane, G.R., 2013, California Seafloor Mapping Program video and photograph portal: U.S. Geological Survey, Coastal and Marine Geology Program data portal, available at https://doi.org/ 10.5066/F7J1015K.

Table 1. Coverage of classified seafloor, in square kilometers (sq km) and percent of total area, broken into California Marine Life Protection Act Depth Zones 2, 3, and 4.

	Total		Depth Zone 2 (water depth 0–30 m)		Depth Zone 3 (water depth 30–100 m)		Depth Zone 4 (water depth >100	
	percent	sq km	percent of total		percent of total	sq km	percent of total	_
Fine- to medium- grained smooth sediment	78.8	75.1	21.6	20.6	46.7	44.5	10.5	1
Mixed smooth sediment and rock	16.2	15.4	6.1	5.9	8.0	7.7	2.0	
Rock and boulder, rugose	4.9	4.7	2.0	1.9	1.7	1.7	1.3	
Medium- to coarse-grained sediment	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	(
Anthropogenic, rugged	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	(









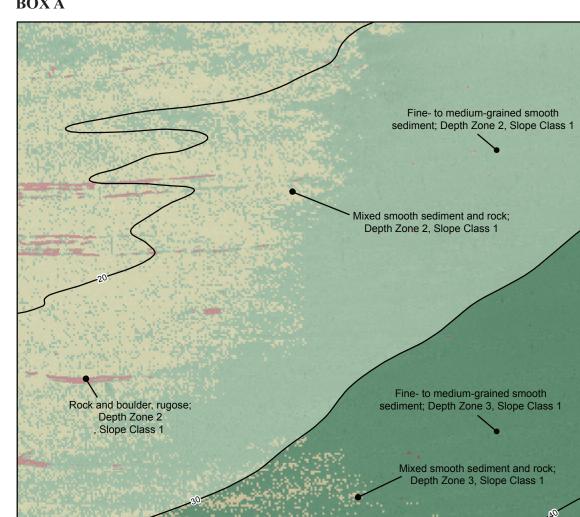
added for depth reference.

Seafloor character mapped in 2016

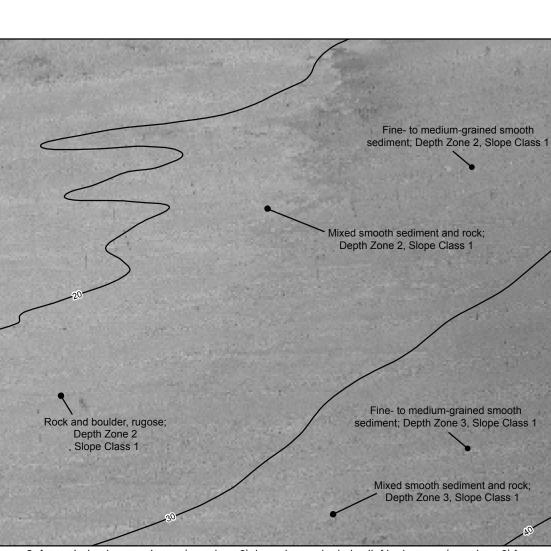
and Stephen R. Hartwell

GIS database and digital cartography by Nadine E. Golden

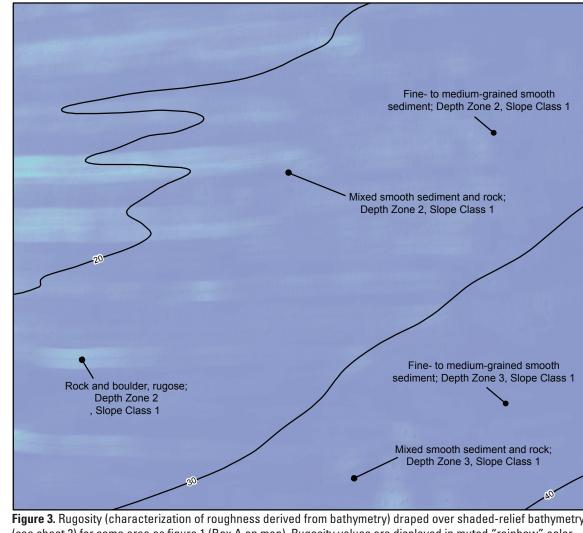
Manuscript approved for publication February 12, 2018



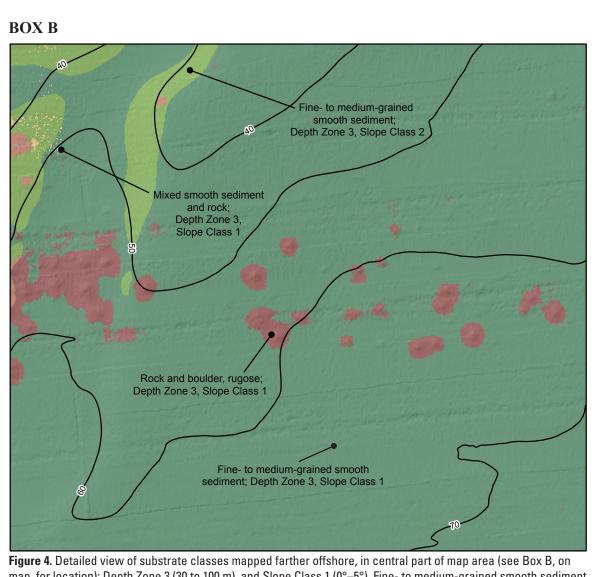
Box A, on map, for location): Depth Zones 2 and 3 (intertidal to 100 m), and Slope Class 1 (0°-5°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown in shades of tan; and rugose rock and boulder is shown in shades of pink. Bathymetric contours (20, 30, and 40 m)



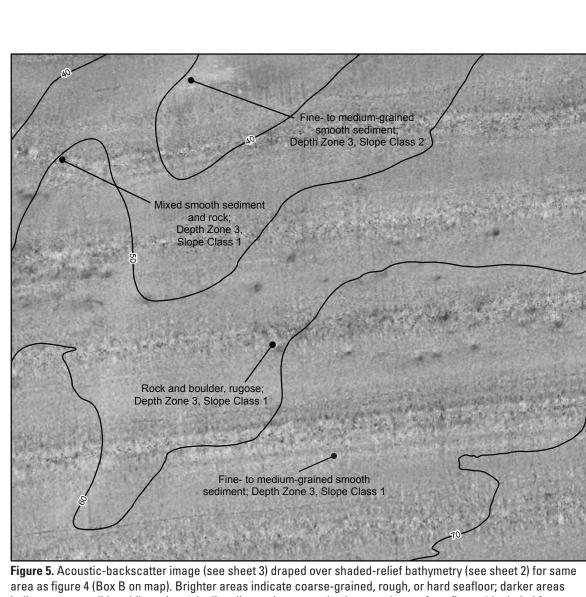
area as figure 1 (Box A on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (loosely packed) sediment. Interpreted substrate classes from figure 1 included for comparison. Bathymetric contours (20, 30, and 40 m) added for depth reference.



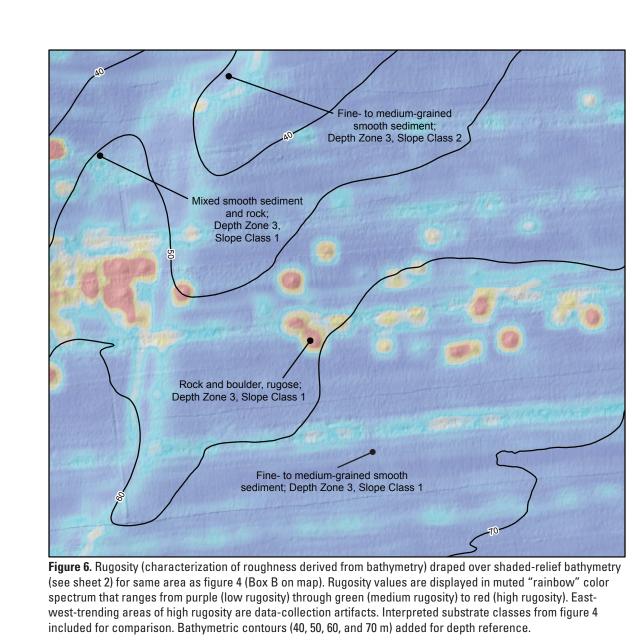
(see sheet 2) for same area as figure 1 (Box A on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity) to red (high rugosity). Eastwest-trending areas of high rugosity are data-collection artifacts. Interpreted substrate classes from figure 1 included for comparison. Bathymetric contours (20, 30, and 40 m) added for depth reference.



map, for location): Depth Zone 3 (30 to 100 m), and Slope Class 1 (0°–5°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown in shades of tan; and rugose rock, boulders, and asphalt mounds are shown in shades of pink.



indicate unconsolidated (loosely packed) sediment. Interpreted substrate classes from figure 4 included for comparison. Bathymetric contours (40, 50, 60, and 70 m) added for depth reference.



Seafloor Character, Offshore of Gaviota Map Area, California

BATHYMETRIC CONTOUR INTERVAL 10 METERS

ONE MILE = 0.869 NAUTICAL MILES